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NATIONAL BROADBAND PLAN

Comments—NBP Public Notice # 12
GN Docket Nos. 09-47, 09-51, and 09-137

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INTRODUCTION

This document provides comments as requested by FCC Public Notice #b 12 in dockets GN Docket Nos. 09-47, 09-51, 09-137, COST ESTIMATES FOR CONNECTING ANCHOR INSTITUTIONS TO FIBER. The comments are based on industry-specific knowledge combined with decades of telecommunications industry experience embodied in Fiberutilities Group, LLC ("FG").

FG is a professional utilities management company, providing communications connectivity management, planning, building and operating services to clients. FG currently provides full operational control of over 8,000 miles of fiber optic network at the operational, data link level, including monitoring and maintenance of the physical network, as well as providing design, planning and construction services for any new fiber network required. For those clients with higher levels of operational sophistication FG provides incremental support services at every layer starting with acquiring network assets (dark fiber) and moving up the value/service chain to full network operation and control.

FG utilizes proprietary financial and engineering modeling tools in conjunction with its collective experience and extensive industry relationships in the creation of detailed feasibility studies, analysis, engineering, network deployment budgets and financial forecasting. FG's approach is typically inclusive of the following:

- Fiber acquisition and new fiber construction
- Carrier negotiation for existing network or for creating new network
- Acquisition or construction of collocation & regeneration facilities
- Procurement, installation and testing of electronics required to light the network
- Operation of the network including monitoring, maintenance and field services

RESPONSES TO FCC QUESTIONS

The numbered questions below are reproduced from the FCC Public Notice. FG's comments are below each question. Not all questions contain comments.

1. **Are there other categories of buildings that should be considered anchor institutions?**

   No comment.

2. **How well do the four categories of population density (dense urban, urban, suburban and rural) segment anchor institutions? Is there need to further divide, for example, the rural grouping (<1,000 persons per square mile) to treat more remote areas differently?**

   The rural grouping has the most variability and is the most expensive to serve. Further definition may be appropriate. Many rural areas, especially in the center 2/3's of the US, contain less than 10 persons per square mile. FG is involved in a health care network in Nebraska where nine hospitals serve an area of 14,000 square miles with a population of 91,000. The distances between population centers (towns as small as 100 people) are generally much greater in these areas than in coastal areas.

3. **How accurate is the assumption that 80% of anchor institutions lack fiber? Does it vary across the different population-density groups? Does it vary by type of anchor institution?**

   If the assumption is active fiber all the way to the premise then the number seems low (the percent lacking fiber is probably much higher) based on FG's experience. FG's management team has built fiber networks in most of the western 2/3 of the US. FG's current focus has been on the central part of the country. FG does not have survey data to confirm the numbers on a national basis, but presents specific knowledge from recent (2006 to present) Iowa and Nebraska projects that illustrate the lack of fiber in most areas.

   In general much of the fiber network built in the 1980's and 1990's were designed to optimize the technology available at the time (primarily TDM circuits), and contained much lower fiber counts, especially in rural areas. There are obsolescence concerns for a not insignificant proportion of the deployed fiber plant because of aging, cladding deterioration and "thinness" (very limited fiber count in each cable). There are also concerns that the original design parameters, including fiber type, regeneration hut spacing and the like, did not contemplate today's technology with significantly higher bandwidth requirements. As a result, there are limits to technology solutions on existing fiber, requiring re-deployment of new technology to add endpoints and capacity to the network.

   In Western Nebraska, the middle mile network is almost completely absent, no non-incumbent telco or cableco fiber is available for any use not channeled through those incumbents, and no commercial investment is available for new construction. The project FG describes in the response to Query 2 above is a completely new, greenfield fiber deployment, made possible by a grant under the Rural Health Care Pilot Program, and includes a carrier-independent fiber ***utility*** with enough spare fiber capacity to make dark fiber available to commercial users (including telcos and cablecos) and to additional public uses.

   In sum the "drop and entrance" construction approach in the Gates model needs to be supplemented to resolve the middle mile problem. The issue is that the fiber plant currently deployed for middle mile is either depleted, not available for new uses or not there at all. Without middle mile fiber there is no advantage gained by building the "last" mile fiber to anchor institutions as contemplated by the Gates Foundation study.[1]

4. **To what extent are the cost estimates for bringing fiber to individual buildings accurate?**

   a. **Are the average loop lengths a reasonable representation of the distance to currently available fiber access points for each density group?**

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[1] The use of the term "Last" mile harks back to the central office-centric nature of the legacy telecom network, and implies that all "services" are delivered to "consumers." Modern networks should be symmetrical and should start with the users, not end with them. The use of "First" mile would put the focus on users rather than providers, and better shape the debate underlying any national broadband plan.

To the extent that middle mile fiber exists these are accurate estimates to make the connections to the users. When fiber routes exist with enough capacity (capacity meaning spare fibers) to provide for commercial use or sale, these routes have been built through and around commercially active areas. Normally the public locations selected for termination in this plan are also located in the same active areas, so it follows that the distance estimates are accurate and correspond to FG's experience.

The issue remains, however, as to whether there is anything for these loops to connect to once built. If the middle mile is not available on a cost effective basis then the target location is left with few options.

b. Are the costs for aerial and trenched deployment representative?

No. Aerial rates reflect reality in the$ 2-$4 range for urban and rural construction including strand installation, fiber, and over-lash. Thirty percent pole replacement would add about $3 per foot ($16k/mile). For existing poles there is the problem of limited access (there may already be several users on the same pole) plus there are pole attachment fees payable to the pole owner which add significantly to operating costs. There is also considerable regulatory uncertainty in pricing pole attachment fees based on the kind of service provider under consideration. For example CATV providers may pay different rates than telco providers; there has been, and continues to be litigation involving service definitions because of the integration of legacy voice, video and data services into a common bit stream.

For buried installations, there are other possible solutions including direct-bury plows (with or without conduit) and boring. Common direct-bury plow rates in a rural area are near $4 per foot (without conduit), and boring or trenching solutions are about $12 per foot. Obtaining a per-site average cost for connection can be problematic given the wide variation in distances, especially in non-urban areas of the country.

Aerial drops are becoming less common in suburban and urban areas because many cities have undertaken urban aesthetics programs which drives utility providers to underground solutions. In rural applications, a direct plow solution is becoming preferable to aerial because the similar cost of installation yields a less damage-prone route. Infrastructure damage frequency and maintenance costs should be considered in looking at the probable cost model. Buried fiber is more costly to maintain due to the cost of marking the fiber in construction zones and the effort required to gain access. In rural areas, however, there is relatively less construction per mile, so this cost can compare positively to the repair costs associated with shotgun blasts, farming equipment pull-downs, and weather damage. In an urban environment, the location cost may compare negatively to aerial route maintenance because construction projects are keenly aware of the presence of overhead plant but do not always know (or check for) buried plant. Cost as a cumulative function of installation and maintenance must be considered because when installation cost is the only consideration, it is quite possible to construct a solution that has undesirable operational characteristics.

When building a model to consider costs, the ratio of aerial to buried must be considered. For urban routes, aerial is the least capital intensive (assuming attachment to existing poles), and the safest when considering damage, but urban renewal projects are driving toward underground applications. Urban costs for underground may be as high as $60 per foot considering the terrain restoration requirements.

c. Is the ratio of trenched to aerial deployment in the high-end cost estimate reasonable for urban and suburban areas?

No. The low end costs seem low. Based on actual construction costs FG believes the numbers should bottom out at $4, not $2.

d. To what extent will aerial plant be available in urban and suburban areas? To what extent will it be possible to add fiber to existing utility conduits or make use of dark fiber, thereby reducing trenching costs, in urban and suburban areas?

FG has found that acquisition of existing fibers or IRU's in existing Telco and CableCo networks is not always economically viable, assuming the fiber is even available; often it is not. The existing purpose-built private networks also tend to reserve fiber for bulk solutions combining many consumers and are rarely built with excess capacity for public or commercial single use. Federal and State regulatory issues may also impact providers (especially rural LEC providers) willingness or ability to share fibers in a common sheath.

Most existing middle mile networks are built with the purpose of providing specific services (voice, video and/or data) to consumers, with the provider retaining full control of the service delivery process. There is little recognition of the need for symmetrical connectivity or of the "utility" aspect of connectivity.

During the 1980's and 1990's a significant amount of empty conduit was constructed by telecom providers along with utilized conduit. Some unused conduit may be available in select locations; it can be an effective solution, especially in metro areas. FG has utilized available conduit in metro Denver and Chicago for network solutions for private clients, but as with dark fiber, FG has found that availability is lessening and the price increasing as the supply of unused conduit diminishes.

Existing utility conduits may be available in some areas but their design, deployment and construction are often not amenable to logical and economical fiber network deployment.

e. Is it reasonable to assume all-aerial installation in rural areas? Is the assumption about requiring 30% new poles accurate? Is the $2-4 per foot cost reflective of the cost of these new poles?

No. Many rural areas, at least in the Midwest and High Plains region are amenable to buried fiber construction (direct bury, no conduit, using plow trains and directional boring). This should be reflected with a $4 minimum cost. See the response to Query 4.b above.

f. **Is the termination cost per building accurate? Is it reflective of both equipment of sufficient capacity and of the labor required to install it?**

Equipment, labor, and inside wiring will average $10,000 to $11,000 per site. This includes the following: (i) optical termination equipment such as an Ethernet switch (at a 1 Gbps level) or a TDM mux (at DS3 – 44.736 Mbps level) to connect to the fiber diversely ($1,500 for each direction); (ii) this equipment must be installed on a rack with short-term UPS power ($2,500); (iii) a firewall/router capable of modest capacity to the premise equipment ($2,500); (iv) associated engineering and installation labor ($2,000); (v) small parts, wiring, outlets, and jumpers ($750). These estimates may be reduced when implemented on a massive scale, but should be retained at face value for a budgetary exercise.

5. **What incremental inside-wiring, or campus-wiring, costs should be added to these estimates? For what type of institutions in what geographies?**

No comment.

6. **To what extent will right-of-way issues lead to incremental costs not reflected in these estimates? How will right-of-way issues impact the timeline of build-out to these institutions?**

Right of way costs vary widely; there are also regulatory and in some cases statutory restrictions on fiber deployment. For example many railroad rights of way are not available for fiber deployment except where the deployment is for "railroad" use. Deploying aerial fiber on existing rights of way also faces widely varying costs and restrictions, and in some cases there is no more space on existing poles for new deployment.

FG's experience is that right-of-way issues can and do have a significant impact on timelines and costs of construction.

7. **Should operating expenses be a consideration when calculating cost for connecting anchor institutions to fiber? What operating expenses would be associated with running these networks, and how would those vary by type of institution and geography?**

Yes. Operating expenses (on a GAAP basis) generally include network operations & maintenance, customer service, general & administrative, depreciation and amortization and interest expense (cost of capital). To offset these costs and provide reserves for upgrades and equipment replacement will require sufficient annual funding of roughly 10% of the total capital expenditures.

As an example of the impact of operating costs on the Gates Foundation model, Figure 1 below includes an estimate of the costs for the anchor institutions served and the additional costs needed to create limited (45 Mbps) middle mile connections using existing network services from a carrier. This example is not definitive, but simply illustrative of the financial implications of the connection from the anchor institution loop/drop to the backbone network or other interconnection point.

COMPARISON - COMMENTS	
- Gates FDN model appears to address the cost of the "last mile" (3,000 feet urban to 20,000 feet rural)	
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	- To complete connectivity by buying DS-3 (44.736 Mbps) from long-haul carriers would cost:
$ 3,000	- per DS3 per month (typical)
123,000	- total buildings served (from Cell B20 above)
$ 369,000,000	- per month
$ 44,280,000,000	- for ten year total cost + original $10B in Gates FDN study for "last mile" connections

Figure 1

8. To what extent will providing fiber to these institutions improve the build-out economics in currently un- or under-served areas?

Unserved and underserved areas exist because the economic justification for private construction does not exist for isolated fiber networks. No private entity is logically willing to make the financial commitment to invest in an “island” of connectivity. Unless the middle mile issue is addressed, the “last mile” construction by itself does not add great value to the community. Any national broadband plan needs to be of the same scope and vision that drove the creation of the interstate highway system (built using primarily federal dollars). The scope should be national and the vision should be utilitarian: provide the framework for connectivity and private enterprise will then have the incentives to provide connectivity at the local level.

9. To what extent will providing fiber to these institutions directly assist last-mile build-outs in currently un- or under-served areas? For example, will bringing fiber to local schools generally provide shorter loop lengths to surrounding homes, or is the location of the communications plant relative to the school and community the primary driver? How will that vary by population density?

As noted in the response to Query 8 above, unless the middle mile issue is addressed, the “last mile” construction by itself does not add great value to the community. The value of any network increases as the number of connections increase. Without the ability to create seamless connectivity on at least a national scale there is insufficient value to incent private or local public entities to invest in private or local networks. The justification for a national broadband plan is simple: the scale required is too large and the logistical and regulatory barriers too formidable for any local or private entity to undertake without the benefit of being part of a well-defined national plan.

Efficient network design requires some idea of the ultimate use of that network. A network design optimized for anchor institutions most likely would not be the optimum design for a full, fiber-to-the-home project, whether or not the target area was unserved or underserved. The number of fibers deployed, the topology of the network, the type and mix of users, and the population density of the area to be served and the availability of interconnection with other networks at common access points all drive network design.

SUMMARY

"We need to treat high speed access to the Internet as a utility – connectivity as basic infrastructure -- so that users can choose what they want to do with the access they are provided."[2]

Again, the interstate highway system is the best example of a similarly challenging project. Highways have long been considered a public utility and federal intervention and control have not been effectively challenged. Today's telecommunications industry is essentially private, not public, which means that any effective National Broadband Plan must take into account the existing infrastructure and the best way to supplement and expand that infrastructure.

The challenge for creating a national broadband connectivity solution on the same scale as the interstate highway system requires first establishing the "public utility" concept for telecommunications then providing the proper incentives for its creation. This may mean limiting the plan to middle-mile network construction, where the network itself is primarily dark fiber, but available to *any* entity, public or private, for lighting fiber and creating network connectivity for all kinds of public and private purposes. One possible approach with the least regulatory complexity would involve creating a high fiber count (432 fibers) in a dark fiber network in the same rights of way as the current interstate highway system. This would cover 160,000 route miles and, if built as a dark fiber network available on an open-access, IRU basis to all providers, could serve as a middle mile network for 95% of the US population.

[2] THE INTERNET AND THE PROJECT OF COMMUNICATIONS LAW, Susan P. Crawford Associate Professor, Cardozo School of Law. J.D., Yale Law School; B.A., Yale College, February 11, 2007. Professor Crawford criticizes the nearly exclusive focus of communications policy on the private economic success of infrastructure and 'application" providers, and suggests that communications policy be focused on facilitating communications themselves.